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(54) **PERSONAL PROTECTION DEVICE**

PERSONENSCHUTZVORRICHTUNG

DISPOSITIF DE PROTECTION PERSONNELLE

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Description

[0001] The present disclosure relates to a protection device for personal protection including an inflatable member adapted to protect from impacts and/or falls a passenger or a rider of a motorcycle or a horse-racing rider or a similar user, during a sporting and/or working activity.

[0002] During recent years, following constant research into safety during all sporting activities, but more generally all those dangerous activities practiced in extreme conditions, or at high speeds, in particular in the motorcycle sector, there has been an increase in the protection devices which have been developed with a view to providing both practical and effective protection of an upper portion of a user's body, using an inflatable member. During an impact, a sliding action or generally a fall, the inflatable bag is placed in fluid communication with a fluid source, such as a compressed-gas cylinder or a fluid generator.

[0003] During an impact, the inflatable element creates an air cushion around the upper portion of the user's body, allowing the user's body to be protected against impacts. The present disclosure is based on a recognition by the inventor of the present patent application that the inflatable bag has normally a shape or form which is similar to that of a vest or waistcoat so that it may be easily worn by a user or so that it may be associated with a garment. As a result the bag has, like a normal jacket, superficial discontinuities or interruptions, for example in a middle region of the chest. In these zones, the bag may be closed by means of a zip associated directly with the bag, or may be kept closed by the zip, or other closing device, of the jacket, such a jacket is known from US 2008/0178370. Other zones where there are superficial discontinuities or interruptions are, for example, those situated underneath the armpits along the sides.

[0004] These superficial discontinuities or interruptions, however, represent vulnerable zones for protection of a user, precisely because the protection is not continuous. Moreover, in particular the zones of the chest and sides are so-called vital zones for a user since they are zones via which, if there is not suitable protection, the vital organs may be reached.

[0005] As a result the similarity in terms of form and shape of the inflatable bag with a vest or waistcoat, if on the one hand it results in the inflatable bag being easier to wear, on the other hand it may have a negative impact on the protective capacity of the inflatable bag, owing to superficial interruptions or discontinuities.

[0006] Moreover, the inventor of the present disclosure has realized that, in some bags, in order to avoid superficial interruptions on the chest and allow positioning of a bag completely in front of the chest, it is necessary to displace the zone of the superficial discontinuity or interruption onto one side of the chest, towards the shoulder.

[0007] Basically, the bag is continuous on the chest and has an interruption on one side, namely no longer in

the center of the chest, which allows the bag to be opened and worn. A zip is also provided in the interruption zone.

[0008] The positioning of the zip in a side zone, however, results in a user having to operate the zip in this side zone which is zone situated off-center and is therefore less accessible.

[0009] This displacement to one side may also have an impact or effect, which is not always positive, on the wearability of garments associated with these bags, since zips for opening the garment are provided in the shoulder zone, and also on the general appearance of the garment which may not be liked by a large number of users.

[0010] Based on these realizations, a technical problem forming the basis of the present disclosure is that of providing a protection device which is able to ensure continuous superficial protection, while ensuring at the same time satisfactory wearability by the user.

[0011] In order to solve this technical problem, a personal protection device is provided, having the main characteristic features which are respectively specified in claim 1, together with a garment according to claim 16 and a method for protecting a user according to claim 17.

[0012] Secondary characteristic features forming the subject of the present disclosure are defined in the corresponding dependent claims.

[0013] In particular, in accordance with the present disclosure, in order to avoid superficial interruptions, a personal protection device is provided where the inflatable member includes at least two inflatable member portions which are superimposed in a corresponding overlapping or superimposition area.

[0014] In order to limit the overall volume and ensure the wearability of the inflatable member, the height of at least one or each of the two superimposed portions of the inflatable member is, in the overlapping area, smaller than the height of the remaining part of the personal protection device so as to ensure a substantial uniform height of the entire personal protection device, irrespective of the superimposed arrangement, and therefore limit the overall volume.

[0015] As a result, according to the present disclosure, in order to avoid superficial discontinuities, two portions of a same inflatable member or of two inflatable members having a smaller height or thickness than a remaining part of the personal protection device are superimposed. These inflatable member portions may be terminal or end portions facing each other when the inflatable member is worn.

[0016] Overlapping may be performed in any user protection zone where discontinuities exist in the inflatable member, or discontinuities are envisaged, such as to obtain protection of the user which is as continuous and complete as possible.

[0017] The two inflatable member portions may be superimposed, for example, on the chest of a user, so as to allow convenient central opening/closing of the protection device. The two inflatable member portions may

also be superimposed, for example, on the sides of a user, or in another part of the body.

[0018] In one embodiment, in order to keep the two inflatable member portions fixed in the superimposed position, the personal protection device includes a connecting device or structure associated with the two inflatable member portions in the superimposition area. The connecting device or structure may be a reversible connecting structure, namely a structure which may be opened or closed as required, and may also be an adjustable connecting structure, namely a structure which may allow superimposition or overlapping of the two portions to be adjusted. For example, in some embodiments, the connecting structure includes a zip structure, a string or lace structure, optionally with Velcro, a structure with buckles and ties, or similar structures.

[0019] As a result, in accordance with some embodiments of the present disclosure, each inflatable member portion of smaller height is associated with the connecting or closing structure so as to ensure stable closure of the two portions of the inflatable member, for example of the two terminal or end portions.

[0020] In one embodiment of the present disclosure, the connecting and closing structure comprises two flaps or panels made of soft material, such as fabric. Each of the two flaps is fixed, for example stitched or glued to one of the two inflatable member portions in a zone adjacent to the superimposition or overlapping area. In this way, when the two inflatable member portions are superimposed, the two flaps are situated close and may be connected together. The two flaps may be fixed to the inflatable member in an intermediate zone between the overlapping area and a nonoverlapping area of the inflatable member.

[0021] The two flaps may be pieces or panels of cloth or fabric which extend along the inflatable member portions. These flaps may be provided with a zip portion or other connecting device of the type which can be opened or reversed, such as Velcro®. In particular, a zip portion associated with a flap is connected in a reversible or temporary manner to a complementary zip portion associated with the other flap.

[0022] Similarly a Velcro® portion associated with one flap and a complementary portion of Velcro® associated with the other flap may be connected together.

[0023] In one embodiment of the present disclosure the flaps may be also be provided with elastic inserts or be made of elastic material, so as to allow adjustment of the dimensions of the personal protection device to the body of the user at the moment of inflation. In particular, when inflation occurs, the two superimposed portions of the inflatable member move away momentarily from each other with a reduction in mutual overlapping. At the end of an inflation condition, the elastic means return into an original condition such that the two inflatable member portions move back towards each other again.

[0024] In one embodiment, as mentioned above, the connecting structure includes one or more strips of cloth

or fabric, a string or similar member, associated with one of the inflatable member portions and a ring, a buckle or similar fastening member associated with the other one of the inflatable member portions. The strip or string is connected to the buckle or similar fastening member in a reversible manner, so as to connect together the two inflatable member portions.

[0025] The inflatable member described above may be easily incorporated inside a garment, for example inside respective pockets of a garment. The garment may be structured so as to have pockets which are superimposed like the inflatable member, and fabric flaps which are joined together. Alternatively, the inflatable member portions which are superimposed may protrude from the pockets of the garment.

[0026] In one embodiment, the inflatable member may be lined externally, or covered, with a fabric suitable for clothing, and assume the appearance of a garment which may be worn on its own.

[0027] Further characteristic features and modes of use forming the subject of the present disclosure will become clear from the following detailed description of a number of preferred examples of embodiment thereof, provided by way of a non-limiting example. It is evident, however, that each example of embodiment may have one or more of the advantages listed above; in any case it is not required that each embodiment should have simultaneously all the advantages listed.

[0028] Reference will be made to the figures of the accompanying drawings in which:

- Figure 1 shows a front view of a protection device according to an embodiment of the present disclosure, in a condition where worn;
- Figure 2 shows a rear view of a protection device according to an embodiment of the present disclosure, in a condition where worn;
- Figure 3 shows a cross-sectional view along the line III-III of the protection device according to Figure 1;
- Figure 4 shows a top plan view of a protection device according to an embodiment of the present disclosure, in an extended condition on a surface;
- Figure 5 shows a cross-sectional view along the line V-V of the protection device according to Figure 4;
- Figure 6 shows a side view of a protection device according to an embodiment of the present disclosure, in a condition where worn;
- Figure 7 shows a cross-sectional view along the line VII-VII of the protection device according to Figure 6;
- Figure 8 shows a front view of a garment including a protection device according to an embodiment of the present disclosure;
- Figure 9 shows a cross-sectional view along the line IX-IX of the protection device according to Figure 8;

[0029] With reference to the accompanying figures, the reference number 10 indicates a personal protection device according to the present disclosure in accordance

with an embodiment of the present disclosure.

[0030] The personal protection device 10 comprises an inflatable member 12 which is adapted to assume substantially a first rest condition or deflated condition, and a second active condition or inflated condition. The modes for inflating the inflatable member 12 will be described in the description below.

[0031] In one embodiment of the present disclosure the inflatable element 12 is in the form of a vest and is adapted to surround a top or chest zone of a user's body. In particular, the inflatable member 12 includes a chest zone 12a, a back zone 12b and a side zone 12c, 12d. The zones 12a, 12b, 12c, 12d are connected together in fluid communication via the shoulders.

[0032] The inflatable member 12 may be made using the technology described in patents EP 2 373 189 and EP 2 373 190. The inflatable member 12 includes a first inflatable member portion 20, 30, 40 and a second inflatable member portion 21, 31, 41. This first inflatable member portion 20, 30, 40 and second inflatable member portion 21, 31, 41 are terminal or end portions of the inflatable member 12 and are partially superimposed. In other words, the first inflatable member portion 20, 30, 40 and this second portion 21, 31, 41 of the inflatable member 12 are portions arranged at the free ends of the inflatable member 12

[0033] Even more particularly, in one embodiment of the present disclosure such as that illustrated in the figures, three superimposition areas, indicated by the reference letters A, B, C, are provided. A first superimposition area A corresponds to a central zone of the chest. A second superimposition area B corresponds to a first side zone of the user. A third superimposition area C corresponds to a second side zone of the user. It is to be understood that a single superimposition area may be provided in the chest zone or the side zone or in another zone of the user's body. Consequently, in an embodiment of the present disclosure such as that shown in the figures, the first portion 20 and the second portion 21 of the inflatable member 12 are end portions situated in the chest region of a user. The first portion 30 and the second portion 31 of the inflatable member are end portions situated along a first side of a user. The first portion 40 and the second portion 41 of the inflatable member are end portions situated along a second side of a user.

[0034] A remaining part of the inflatable member 12 which does not have superimposed or overlapped zones is adjacent to the overlapping area A, B, C and is indicated generally by the reference number 18. As a result the inflatable member 12 also covers substantially the entire torso without superficial discontinuities.

[0035] According to at least one aspect of the present disclosure, the height or thickness of at least one or each of the first portion 20, 30, 40 of the inflatable member and the second portion 21, 31, 41 of the inflatable member is, in the overlapping area, smaller than the height or thickness of the remaining part of the personal protection device so as to ensure a substantially uniform height of

the entire personal protection device (as can be seen in Figure 3, Figure 7 and Figure 9), independently of the overlapping, and therefore limit the overall volume. The different height is obtained using textile structures with threads of different height, as described in the patents EP 2 373 189 and EP 2 373 190 which are mentioned above.

[0036] More particularly, in accordance with said technology, the inflatable member has a height/thickness which can be determined beforehand. In fact, the inflatable member 12 comprises a plurality of tie members 13, in the example threads, which are indicated diagrammatically in Figure 3 and Figure 5 and are distributed inside the inflatable member 12, said tie members 13 being stably connected to opposite surface portions of the inflatable member 12.

[0037] Said tie members 13 have in particular a length such that, when the inflatable member 12 is in the deflated rest condition, the tie members 13 are in a non-tensioned condition and are collapsed inside the inflatable member 12, whereas, when the inflatable member 12 is in the inflated condition, the tie members 13 are subjected to tensile stress. More particularly, the tie members 13 are connected to respective meshes 14 which are lined or covered externally by sheets or walls 15. In practice, the inflatable member 12 includes a first sheet 15 or first wall, to which a first mesh 14 is adheringly fixed, and a second sheet 15, or second wall, to which a second mesh is adheringly fixed, wherein said meshes 14 are connected together by means of the plurality of tie members 13. The two sheets 15 are situated opposite each other and are perimetally connected in a sealed manner along respective perimetral edges.

[0038] The height of the inflatable member 12 can be adjusted by suitably setting the maximum distance which can be obtained between the meshes 14 with a maximum longitudinal extension of the tie members. Essentially, the inflatable member 12 has a height which can be determined beforehand, since the maximum expansion of the inflatable member can be controlled by controlling the length and the maximum tension of the tie members.

[0039] As a result, in order to obtain an inflatable member having portions of different heights, it is possible to use two structures 114a, 114b (formed by meshes 14 and tie members 13 of suitable height) where the length is chosen so as to determine a maximum mutual distance between the meshes 14 corresponding to a maximum local expansion of the respective inflatable member in the inflated condition. Basically two textile structures 114a, 11b with tie members 13 having different lengths are used.

[0040] An edge of a first mesh 14 of a textile structure 114a having a smaller height may be joined or stitched to a respective edge of a mesh of another textile structure 114b having a greater height, and similarly the edges of the respective opposite meshes 114 are stitched or joined together, as shown in Figures 3 and 5. In this way, the portions in which the tie members 13 have different

lengths are joined together.

[0041] The meshes 14 and the tie members with different lengths are enclosed between the sheets 15 of soft material and are gas-tight, for example made of polyurethane or polyamide, having a greater surface area than the meshes 14.

[0042] In some embodiments, the smaller length of the tie members is chosen so as to obtain a portion 20, 21; 30, 31, 40, 41 of the inflatable member 12 of about 37 mm height.

[0043] The remaining part of the inflatable member 12 has instead a height of 50 mm.

[0044] In this way, in the overlapping areas A, B, C it is possible to control and limit the overall volume.

[0045] In one embodiment, such as that shown in the Figures, the personal protection device 10 includes one or more connecting and closing devices or structures 50, associated with the first portion 20, 30, 40 of the inflatable member and the second portion 21, 31, 41 of the inflatable member in the region of the superimposition area A, B, C. The connecting device or structure 50 is a zip structure, for example in the superimposition area A, and a structure with Velcro strings, straps or laces in the area B and in the superimposition area C. It is to be understood that the connecting structures 50 of the three superimposition areas may be all the same or inverted in different ways with respect to the embodiment shown in the figures.

[0046] It can be seen that one of the first inflatable member portion 20, 30, 40 and second inflatable member portion 21, 31, 41 is associated with a part of the connecting structure 50 which is connected to the complementary part of the connecting structure 50 associated with the other one of the first portion 20, 30, 40 and the second portion 21, 31, 41 so as to ensure stable closing of the first inflatable member portion 20, 30, 40 and the second inflatable member portion 21, 31, 41.

[0047] In one embodiment, such as that shown in the figures, the connecting structure 50, such as that which is situated on the user's chest, comprises two flaps or panels made of soft material 51, 52 such as fabric. Each of the two flaps 51, 52 is fixed, for example stitched or glued to one of the two portions 20, 21 of the inflatable member 12 in a zone adjacent to the superimposition or overlapping area A. These flaps may extend over the entire inflatable member 12, lining it on the outer side.

[0048] In the overlapping area A the two flaps 51 and 52 are free and movable with respect to the inflatable member 12.

[0049] In this way, when the two portions 20, 21 of the inflatable member 12 are superimposed, the two flaps 51, 52 are situated close and may be connected together. The two flaps 51, 52 may be pieces or panels of cloth or fabric which extend over an entire length of the portions 20, 21 of the inflatable member 12, so as to allow a continuous connection between the two portions 20, 21. These flaps 51, 52 may be provided at respective ends with a zip portion 53, 54 or other connecting device of

the type which can be opened or reversed. A zip portion 53 associated with a flap 51 is connected in a reversible or temporary manner to a complementary zip portion 54 associated with the other flap 52.

[0050] Consequently, the two inflatable member portions 20, 21 may be superimposed, for example, on the chest of a user and the connecting structure 50 may be arranged in the centre of the chest so as to allow convenient central opening/closing of the protection device 10.

[0051] Even more particularly, the flaps 51, 52 are provided with elastic inserts 55, for example in the superimposition area A, namely where the flaps 51, 52 are freely movable. In an alternative embodiment, the flaps 51, 52 are made of a totally elastic fabric. The presence of the flaps with inserts 55 which are elastic or made of elastic fabric allows widening of the inflatable member 12 during inflation, thus preventing an increase in volume of the inflatable member from causing any constriction of the user's body. In other words, the elastic material allows adaptation of the entire inflation device of the inflatable member 12 and is also able to favor the return of the inflatable member into the deflated condition; this is possible owing to the typical properties of the elastic material which, once deformed under a deforming action (in this case caused by the inflation of the inflatable member), resumes its normal or initial configuration when the deforming action ceases.

[0052] In fact, when the inflatable member 12 is inflated, the insert is in a completely deformed condition and the overall extension of the protection device in fact increases, whereas, when the inflatable member in the deflated condition, the elastic insert returns into an undeformed or only partially deformed condition, thus also causing the entire inflatable member 12 to return into its initial condition.

[0053] It should be noted that the portions 20, 21, 30, 31, 40, 41 of the inflatable member move away from each other during inflation and, owing to the elastic material, return into the initial position.

[0054] In one embodiment, such as that shown in the figures and as already mentioned above, the connecting structure 50, such as that associated with the area B and with the superimposition area C includes a strip or strap, and more particularly in the example two pairs of fabric strips or straps 60 with a suitable resistance to tensile stress. The strips 60 are provided with Velcro sections 61 for fixing together. Each strip 60 is associated with one of the portions of the inflatable member 12 (first portion 30, 40 and second portion 31, 41). The strip or string 60 is connected by means of Velcro to the other strip by fixing together the Velcro so as to connect the first inflatable member portion 30, 40 and the second inflatable member portion 31, 41 in a reversible manner (Figure 7). The extension of the Velcro is such as to allow the degree of overlapping to be adjusted and the fit of the protection device to be adapted to the chest of a user.

[0055] The strip 60 may also be provided with an elastic

insert 55, as can be seen in Figure 7.

[0056] As a result, the two portions 30, 31; 40, 41 of the inflatable member may be superimposed for example on the sides of a user, or on the chest, so as to allow easy central opening/closing of the protection device 10 and also adjustment of the mutual superimposition, with adaptation of the fit.

[0057] It is also pointed out that the inflatable member 12 described above may be easily incorporated inside a garment, such as a jacket 100 (Figure 8), for example inside respective pockets 80 of a garment.

[0058] The garment 100 may be designed with a structure having pockets 80 for containing the inflatable member 12, which are superimposed in the same way as the inflatable member. More particularly, each pocket 80 has an inner wall 80a which coincides with an inner lining and an outer wall which coincides with a visible surface of the garment.

[0059] The garment includes flaps 81, 82 which are entirely comparable in terms of structure and function to the flaps 51, 52 described above and provided, where appropriate, with an elastic insert 83. The flaps 81, 82 are fixed to the outer wall 80b of the pocket and are free and movable in a superimposition area, so as to allow the garment to be closed and a closed condition of the inflatable member to be maintained in the superimposition area.

[0060] Alternatively, as mentioned above, in one embodiment, the inflatable member 12 may be lined externally, or covered, with a fabric suitable for clothing, and assume the appearance of a garment which may be worn on its own.

[0061] With regard to inflation, in order to perform inflation of the inflatable element 12, in the event of a sudden fall and/or sliding and/or an impact involving a user or a vehicle being ridden/driven, the protection device 10 is adapted to cooperate with special activation means (not shown) which are operationally connected to the cylinder (not shown) containing compressed cold gas, for example helium. The cylinder may be provided with a respective shut-off valve (not shown).

[0062] Alternatively, the inflation fluid source may comprise gas generators of the pyrotechnical or other hybrid type or other types known according to the state of the art.

[0063] Opening of the shut-off valve of each inflation cylinder is preferably controlled by a control unit depending on detection of the state of the vehicle/rider system; for example said control unit may implement a system for predicting the fall which allows early identification of the fall event and a reliable prediction of this by accelerometer sensor means fixed to the vehicle (or rider) and a unit for processing the signals produced by the said sensors.

[0064] Alternatively, the device according to the present disclosure may also be applied using an activation cable connected to a vehicle ridden by a user, which cable activates inflation of the inflatable element following the movement of the user away from the vehicle, for ex-

ample following a fall or a sudden impact. Use of a cable is employed in particular in the horse-riding sector.

[0065] In any case the aforementioned activation and inflation means may be integrated in the protection device according to the present invention or located on the outside thereof.

[0066] It should also be noted that the activation modes, although being an aspect of particular importance for effective operation of the device, will not be further described in greater detail since they are methods which are essentially already known to a person skilled in the art of protection of an individual from sudden impacts.

[0067] The subject-matter of the present disclosure has been described hitherto with reference to preferred embodiments thereof. It is to be understood that other embodiments relating to the same inventive idea may exist, all of these falling within the scope of protection of the claims which are attached below.

Claims

1. Personal protection device (10) for the protection of a portion of the body of a user, said device comprising an inflatable member (12) intended to protect at least partially a zone of the body of a user, wherein the personal protection device (10) includes at least a first portion (20, 30, 40) of the inflatable member (12) and a second portion (21, 31, 41) of the inflatable member (12), **characterised in that** the first portion (20, 30, 40) of the inflatable member (12) and the second portion (21, 31, 41) of the inflatable member (12) are superimposed in a corresponding overlapping area or superimposition area (A, B, C), and wherein the height or thickness of at least one, or each, of the first portion (20, 30, 40) of the inflatable member (12) and the second portion (21, 31, 41) of the inflatable member (12) is, in the overlapping area or superimposition area (A, B, C), smaller than the height or thickness of a remaining part (18) of the inflatable member (12).
2. Personal protection device (10) according to claim 1, wherein said smaller height of at least one, or each, of the first portion (20, 30, 40) of the inflatable member (12) and the second portion (21, 31, 41) of the inflatable member (12) with respect to a remaining part (18) of the inflatable member (12) is only in the overlapping area or superimposition area (A, B, C).
3. Personal protection device (10) according to claim 1 or 2, wherein the inflatable member (12) includes two adjacent textile structures (114a, 114b) connected to each other, wherein a first textile structure (114a) is included in one, or each, of the first portion (20, 30, 40) of the inflatable member (12) and the

second portion (21, 31, 41) and a second textile structure (114b) is included in the remaining part (18) of the inflatable member (12) and wherein the height of the first textile structure (114a) is smaller than the height of the second textile structure (114b).

4. Personal protection device (10) according to claim 3, wherein each textile structure (114a, 114b) includes pairs of opposite meshes (14) and a plurality of tie members (13) positioned between the meshes (14), the tie members having ends stably associated with surface portions of said meshes (14), wherein said tie members (13) have dimensions so that, when said inflatable member (12) is in a deflated rest condition, said tie members (13) are in a non-tensioned condition collapsed inside the inflatable member, whereas when said inflatable member (12) is in an inflated condition, said tie members (13) are subjected to tensile stress, and wherein the height of the respective textile structure (114a, 114b) depends on the length of said tie members (13).
5. Personal protection device (10) according to any one of the preceding claims, wherein the remaining part (18) of the inflatable member (12) is a part adjacent respectively to the first portion (20, 30, 40) of the inflatable member (12) and to the second portion (21, 31, 41) of inflatable member (12).
6. Personal protection device (10) according to any one of the preceding claims, wherein the first portion (20, 30, 40) of the inflatable member (12) and the second portion (21, 31, 41) of the inflatable member (12) are terminal portions or end portions of the inflatable member (12).
7. Personal protection device (10) according to any one of the preceding claims, including at least one connecting device or structure (50) associated with the first portion (20, 30, 40) of the inflatable member (12) and the second portion (21, 31, 41) of the inflatable member (12) and arranged in a middle zone of the overlapping (area A, B, C), wherein the connecting device or structure (50) is a structure which allows a reversible connection between the first portion (20, 30, 40) of the inflatable member (12) and the second portion (21, 31, 41) of the inflatable member (12).
8. Personal protection device (10) according to any one of the preceding claims, including at least one connecting device or structure (50) associated with the first portion (20, 30, 40) of the inflatable member (12) and the second portion (21, 31, 41) of the inflatable member (12) and arranged in the region of the overlapping area (A, B, C), wherein one of the first inflatable member portion (20, 30, 40) and second inflatable member portion (21, 31, 41) is associated with a part of the connecting structure (50) which is connected to the complementary part of the connecting structure (50) associated with the other one of the first portion (20, 30, 40) and the second portion (21, 31, 41) so as to ensure stable closing of the first inflatable member portion (20, 30, 40) and the second inflatable member portion (21, 31, 41).
9. Personal protection device (10) according to claim 7 or 8, wherein the connecting device or structure (50) is a zip structure or a structure with strings, straps or laces.
10. Personal protection device (10) according to any one of the preceding claims 7 to 9, wherein the connecting structure (50) comprises two flaps (51, 52), or panels, made of soft material, wherein each of the two flaps is fixed, for example stitched or glued, to one of the two inflatable member portions in a zone adjacent to the superimposition or overlapping area and that when the two inflatable member portions are superimposed, the two flaps are situated close and may be connected together..
11. Personal protection device (10) according to any one of the preceding claims, wherein the overlapping area is a front area of the torso of a user.
12. Personal protection device (10) according to any one of the preceding claims, wherein the overlapping area is a side area of the torso of a user.
13. Personal protection device (10) according to any one of the preceding claims, wherein the remaining part of the inflatable member does not have superimposed or overlapped zones and is adjacent to the overlapping area (A, B, C).
14. Personal protection device (10) according to any one of the preceding claims, wherein the connecting structure (50) comprises elastic inserts (55) or is made of elastic material.
15. Personal protection device (10) according to claim 10, wherein each or one of the two flaps includes elastic inserts (55) or is made of elastic material.
16. Garment (100) including, or in combination with, a personal protection device according to any one of the preceding claims.
17. Method for protecting a user comprising the step of
 - arranging an inflatable member (12) at least partially on a region of the user's body, **characterised in that** a first portion (20, 30, 40) of said inflatable member (12) is superimposed on a second portion (21, 31, 41) of the inflatable member (12) in a corresponding overlapping ar-

ea or superimposition area (A, B, C), and wherein the height or thickness of at least one, or each, of the first portion (20, 30, 40) of the inflatable member (12) and the second portion (21, 31, 41) of the inflatable member (12) is, in the overlapping area or superimposition area (A, B, C), smaller than the height or thickness of a remaining part (18) of the inflatable member (12).

18. Method according to claim 17, wherein the first portion (20, 30, 40) of the inflatable member (12) and the second portion (21, 31, 41) of the inflatable member (12) are connected by elastic means such that, during inflation of the first portion (20, 30, 40) of the inflatable member (12) and the second portion (21, 31, 41) of the inflatable member (12), the first portion (20, 30, 40) of the inflatable member (12) and the second portion (21, 31, 41) of the inflatable member (12) move temporarily away from each other thus decreasing a respective overlapping condition and, at the end of inflation, the elastic means return into an original condition such that the first portion (20, 30, 40) of the inflatable member (12) and the second portion (21, 31, 41) of the inflatable member (12) move again close to each other.

Patentansprüche

1. Persönliche Schutzvorrichtung (10) zum Schutz eines Teils des Körpers eines Benutzers, wobei die Vorrichtung ein aufblasbares Element (12) umfasst, das dazu bestimmt ist, zumindest teilweise eine Zone des Körpers eines Benutzers zu schützen, wobei die persönliche Schutzvorrichtung (10) mindestens einen ersten Abschnitt (20, 30, 40) des aufblasbaren Elements (12) und einen zweiten Abschnitt (21, 31, 41) des aufblasbaren Elements (12) einschließt, **dadurch gekennzeichnet, dass** der erste Abschnitt (20, 30, 40) des aufblasbaren Elements (12) und der zweite Abschnitt (21, 31, 41) des aufblasbaren Elements (12) in einem entsprechenden überlappenden Bereich oder Überlagerungsbereich (A, B, C) überlagert sind, und wobei die Höhe oder Dicke von mindestens einem oder jedem von dem ersten Abschnitt (20, 30, 40) des aufblasbaren Elements (12) und von dem zweiten Abschnitt (21, 31, 41) des aufblasbaren Elements (12) im Überlappungsbereich oder Überlagerungsbereich (A, B, C) kleiner als die Höhe oder Dicke eines verbleibenden Teils (18) des aufblasbaren Elements (12) ist.
2. Persönliche Schutzvorrichtung (10) gemäß Anspruch 1, wobei die kleinere Höhe von mindestens einem von oder jedem von dem ersten Abschnitt (20, 30, 40) des aufblasbaren Elements (12) und von dem zweiten Abschnitt (21, 31, 41) des aufblasbaren Ele-

ments (12) in Bezug auf einen verbleibenden Teil (18) des aufblasbaren Elements (12) nur im Überlappungsbereich oder Überlagerungsbereich (A, B, C) vorliegt.

3. Persönliche Schutzvorrichtung (10) gemäß Anspruch 1 oder 2, wobei das aufblasbare Element (12) zwei benachbarte textile Strukturen (114a, 114b) aufweist, die miteinander verbunden sind, wobei eine erste Textilstruktur (114a) in einem oder jedem von dem ersten Abschnitt (20, 30, 40) des aufblasbaren Elements (12) und von dem zweiten Abschnitt (21, 31, 41) des aufblasbaren Elements (12) enthalten ist und eine zweite Textilstruktur (114b) in dem verbleibenden Teil (18) des aufblasbaren Elements (12) enthalten ist und wobei die Höhe der ersten Textilstruktur (114a) kleiner ist als die Höhe der zweiten Textilstruktur (1, 14b).
4. Persönliche Schutzvorrichtung (10) gemäß Anspruch 3, wobei jede Textilstruktur (114a, 114b) Paare von gegenüberliegenden Maschen (14) und eine Vielzahl von Verbindungsgliedern (13) einschließt, die zwischen den Maschen (14) angeordnet sind, wobei die Verbindungsglieder Enden aufweisen, die mit den Oberflächenabschnitten der Maschen (14) stabil verbunden sind, wobei die Verbindungsglieder (13) solche Abmessungen aufweisen, dass, wenn das aufblasbare Element (12) in einem deflationierten Ruhezustand ist, die Verbindungsglieder (13) in einem nicht gespannten Zustand innerhalb des aufblasbaren Elements zusammengefallen sind, während, wenn das aufblasbare Element (12) in einem aufgeblasenen Zustand ist, die Verbindungsglieder (13) einer Zugspannung ausgesetzt sind, und wobei die Höhe der jeweiligen Textilstruktur (114a, 114b) von der Länge der Verbindungsglieder (13) abhängt.
5. Persönliche Schutzvorrichtung (10) gemäß einem beliebigen der vorhergehenden Ansprüche, wobei der verbleibende Teil (18) des aufblasbaren Elements (12) ein Teil ist, der jeweils zu dem ersten Abschnitt (20, 30, 40) des aufblasbaren Elements (12) und zu dem zweiten Abschnitt (21, 31, 41) des aufblasbaren Elements (12) benachbart ist.
6. Persönliche Schutzvorrichtung (10) gemäß einem beliebigen der vorhergehenden Ansprüche, wobei der erste Abschnitt (20, 30, 40) des aufblasbaren Elements (12) und der zweite Abschnitt (21, 31, 41) des aufblasbaren Elements (12) Endabschnitte oder Endabschnitte des aufblasbaren Elements (12) sind.
7. Persönliche Schutzvorrichtung (10) gemäß einem beliebigen der vorhergehenden Ansprüche, aufweisend mindestens eine Verbindungsstruktur (50), die mit dem ersten Abschnitt (20, 30, 40) des aufblasbaren Elements (12) und dem zweiten Abschnitt (21,

- 31, 41) des aufblasbaren Elements (12) verbunden ist, und die in einem mittleren Bereich der Überlappung (Bereich A, B, C) angeordnet ist, wobei die Verbindungsstruktur (50) eine Struktur ist, die eine reversible Verbindung zwischen dem ersten Abschnitt (20, 30, 40) des aufblasbaren Elements (12) und dem zweiten Abschnitt (21, 31, 41) des aufblasbaren Elements (12) ermöglicht.
8. Persönliche Schutzvorrichtung (10) gemäß einem beliebigen der vorhergehenden Ansprüche, aufweisend zumindest eine Verbindungsstruktur (50), die mit dem ersten Abschnitt (20, 30, 40) des aufblasbaren Elements (12) und dem zweiten Abschnitt (21, 31, 41) des aufblasbaren Elements (12) verbunden ist, und die in dem Bereich des Überlappungsbereichs (A, B, C) angeordnet ist, wobei einer von dem ersten aufblasbaren Element-Abschnitt (20, 30, 40) und von dem zweiten aufblasbaren Element-Abschnitt (21, 31, 41) mit einem Teil der Verbindungsstruktur (50) verbunden ist, der mit dem komplementären Teil der Verbindungsstruktur (50) verbunden ist, der mit dem anderen von dem ersten Abschnitt (20, 30, 40) und von dem zweiten Abschnitt (21, 31, 41) verbunden ist, um einen stabilen Verschluss des ersten aufblasbaren Element-Abschnitts (20, 30, 40) und des zweiten aufblasbaren Element-Abschnitts (21, 31, 41) zu gewährleisten.
9. Persönliche Schutzvorrichtung (10) gemäß Anspruch 7 oder 8, wobei die Verbindungsvorrichtung oder -struktur (50) eine Reißverschlussstruktur oder eine Struktur mit Saiten, Riemen oder Schnürsenkeln ist.
10. Persönliche Schutzvorrichtung (10) gemäß einem beliebigen der vorhergehenden Ansprüche 7 bis 9, wobei die Verbindungsvorrichtung oder -struktur (50) zwei Klappen (51, 52) oder Platten aufweist, die aus weichem Material hergestellt sind, wobei jede der beiden Klappen (51, 52) an einen der beiden Abschnitte des aufblasbaren Elements befestigt, zum Beispiel genäht oder geklebt sind, in einem Bereich, der benachbart ist zu dem Überlappungsbereich oder Überlagerungsbereich, und das, wenn die beiden Abschnitte des aufblasbaren Elements überlagert werden, die beiden Klappen nah zueinander angeordnet sind und miteinander verbunden werden können.
11. Persönliche Schutzvorrichtung (10) gemäß einem beliebigen der vorhergehenden Ansprüche, wobei der Überlappungsbereich ein vorderer Bereich des Torsos eines Benutzers ist.
12. Persönliche Schutzvorrichtung (10) gemäß einem beliebigen der vorhergehenden Ansprüche, wobei der Überlappungsbereich ein Seitenbereich des Torsos eines Benutzers ist.
13. Persönliche Schutzvorrichtung (10) gemäß einem beliebigen der vorhergehenden Ansprüche, wobei der verbleibende Teil des aufblasbaren Elements keine überlappten oder überlagerten Bereiche aufweist und zu dem Überlagerungsbereich (A, B, C) benachbart ist.
14. Persönliche Schutzvorrichtung (10) gemäß einem beliebigen der vorhergehenden Ansprüche, wobei die Verbindungsstruktur (50) elastische Einsätze (55) aufweist oder aus elastischem Material besteht.
15. Persönliche Schutzvorrichtung (10) gemäß Anspruch 10, wobei jede oder eine der beiden Klappen elastische Einsätze (55) aufweist oder aus elastischem Material besteht.
16. Kleidungsstück (100) mit oder in Kombination mit einer persönlichen Schutzvorrichtung gemäß einem beliebigen der vorhergehenden Ansprüche.
17. Verfahren zum Schützen eines Benutzers, umfassend den folgenden Schritt:
- Anordnen eines aufblasbaren Elements (12) zumindest teilweise auf einem Bereich des Körpers des Benutzers, **dadurch gekennzeichnet, dass** ein erster Abschnitt (20, 30, 40) des aufblasbaren Elements (12) über einen zweiten Abschnitt (21, 31, 41) des aufblasbaren Elements (12) in einem entsprechenden Überlappungsbereich oder Überlagerungsbereich (A, B, C) angeordnet wird, und wobei die Höhe oder die Dicke mindestens eines oder von jedem von dem ersten Abschnitt (20, 30, 40) des aufblasbaren Elements (12) und dem zweiten Abschnitt (21, 31, 41) des aufblasbaren Elements (12) im Überlappungsbereich oder Überlagerungsbereich (A, B, C) kleiner ist als die Höhe oder Dicke eines verbleibenden Teils (18) des aufblasbaren Teils (12).
18. Verfahren gemäß Anspruch 17, wobei der erste Abschnitt (20, 30, 40) des aufblasbaren Elements (12) und der zweite Abschnitt (21, 31, 41) des aufblasbaren Elements (12) durch elastische Mittel so verbunden sind, dass während des Aufblasens des ersten Teils (20, 30, 40) des aufblasbaren Elements (12) und des zweiten Teils (21, 31, 41) des aufblasbaren Elements (12) der erste Abschnitt (20, 30, 40) des aufblasbaren Elements (12) und der zweite Abschnitt (21, 31, 41) des aufblasbaren Elements (12) sich vorübergehend voneinander weg bewegen, wodurch ein jeweiliger überlappender Zustand verringert wird, und am Ende des Aufblasens die elastischen Mittel so in einen ursprünglichen Zustand zu-

rück kehren, dass der erste Abschnitt (20, 30, 40) des aufblasbaren Elements (12) und der zweite Abschnitt (21, 31, 41) des aufblasbaren Elements (12) sich wieder nahe beieinander bewegen.

Revendications

1. Dispositif de protection personnelle (10) pour la protection d'une partie du corps d'un utilisateur, ledit dispositif comprenant un élément gonflable (12) prévu pour protéger au moins partiellement une zone du corps d'un utilisateur, dans lequel le dispositif de protection personnelle (10) comprend au moins une première partie (20, 30, 40) de l'élément gonflable (12) et une seconde partie (21, 31, 41) de l'élément gonflable (12),
caractérisé en ce que la première partie (20, 30, 40) de l'élément gonflable (12) et la seconde partie (21, 31, 41) de l'élément gonflable (12) sont superposées dans une zone de chevauchement ou une zone de superposition (A, B, C) correspondante, et dans lequel la hauteur ou l'épaisseur d'au moins l'une, ou de chacune parmi la première partie (20, 30, 40) de l'élément gonflable (12) et la seconde partie (21, 31, 41) de l'élément gonflable (12) est, dans la zone de chevauchement ou la zone de superposition (A, B, C), inférieure à la hauteur ou l'épaisseur d'une partie résiduelle (18) de l'élément gonflable (12).
2. Dispositif de protection personnelle (10) selon la revendication 1, dans lequel ladite plus petite hauteur d'au moins l'une ou de chacune parmi la première partie (20, 30, 40) de l'élément gonflable (12) et la seconde partie (21, 31, 41) de l'élément gonflable (12) par rapport à une partie résiduelle (18) de l'élément gonflable (12), est uniquement dans la zone de chevauchement ou la zone de superposition (A, B, C).
3. Dispositif de protection personnelle (10) selon la revendication 1 ou 2, dans lequel l'élément gonflable (12) comprend deux structures textiles (114a, 114b) adjacentes raccordées entre elles, dans lequel une première structure textile (114a) est comprise dans l'une ou chacune parmi la première partie (20, 30, 40) de l'élément gonflable (12) et la seconde partie (21, 31, 41) et une seconde structure textile (114b) est comprise dans la partie résiduelle (18) de l'élément gonflable (12) et dans lequel la hauteur de la première structure textile (114a) est inférieure à la hauteur de la seconde structure textile (114b).
4. Dispositif de protection personnelle (10) selon la revendication 3, dans lequel chaque structure textile (114a, 114b) comprend des paires de mailles opposées (14) et une pluralité d'éléments d'attache (13) positionnés entre les mailles (14), les éléments d'attache ayant des extrémités associées, de manière stable, avec des parties de surface desdites mailles (14), dans lequel lesdits éléments d'attache (13) ont des dimensions de sorte que, lorsque ledit élément gonflable (12) est dans une condition au repos dégonflée, lesdits éléments d'attache (13) sont dans une condition non tendue, repliés à l'intérieur de l'élément gonflable, alors que lorsque ledit élément gonflable (12) est dans une condition gonflée, lesdits éléments d'attache (13) sont soumis à une contrainte de traction, et dans lequel la hauteur de la structure textile (114a, 114b) respective dépend de la longueur desdits éléments d'attache (13).
5. Dispositif de protection personnelle (10) selon l'une quelconque des revendications précédentes, dans lequel la partie résiduelle (18) de l'élément gonflable (12) est une partie respectivement adjacente à la première partie (20, 30, 40) de l'élément gonflable (12) et à la seconde partie (21, 31, 41) de l'élément gonflable (12).
6. Dispositif de protection personnelle (10) selon l'une quelconque des revendications précédentes, dans lequel la première partie (20, 30, 40) de l'élément gonflable (12) et la seconde partie (21, 31, 41) de l'élément gonflable (12) sont des parties terminales ou des parties d'extrémité de l'élément gonflable (12).
7. Dispositif de protection personnelle (10) selon l'une quelconque des revendications précédentes, comprenant au moins un dispositif ou structure de raccordement (50) associé(e) avec la première partie (20, 30, 40) de l'élément gonflable (12) et la seconde partie (21, 31, 41) de l'élément gonflable (12) et agencé(e) dans une zone centrale de la zone de chevauchement (A, B, C), dans lequel le dispositif ou structure de raccordement (50) est une structure qui permet un raccordement réversible entre la première partie (20, 30, 40) de l'élément gonflable (12) et la seconde partie (21, 31, 41) de l'élément gonflable (12).
8. Dispositif de protection personnelle (10) selon l'une quelconque des revendications précédentes, comprenant au moins un dispositif ou structure de raccordement (50) associé(e) avec la première partie (20, 30, 40) de l'élément gonflable (12) et la seconde partie (21, 31, 41) de l'élément gonflable (12) et agencé(e) dans la région de la zone de chevauchement (A, B, C), dans lequel l'une parmi la première partie d'élément gonflable (20, 30, 40) et la seconde partie d'élément gonflable (21, 31, 41) est associée à une partie de la structure de raccordement (50) qui est raccordée à la partie complémentaire de la structure de raccordement (50) associée à l'autre parmi

la première partie (20, 30, 40) et la seconde partie (21, 31, 41) afin de garantir la fermeture stable de la première partie d'élément gonflable (20, 30, 40) et de la seconde partie d'élément gonflable (21, 31, 41).

9. Dispositif de protection personnelle (10) selon la revendication 7 ou 8, dans lequel le dispositif ou structure de raccordement (50) est une structure de fermeture éclair ou une structure avec des cordons, des bandes ou des lacets. 5
10. Dispositif de protection personnelle (10) selon l'une quelconque des revendications 7 à 9, dans lequel la structure de raccordement (50) comprend deux rabats (51, 52) ou panneaux, réalisés à partir d'une matière souple, dans lequel chacun des deux rabats est fixé, par exemple cousu ou collé, à l'une des deux parties d'élément gonflable dans une zone adjacente à la zone de superposition ou de chevauchement et en ce que lorsque les deux parties d'élément gonflable sont superposées, les deux rabats sont situés à proximité et peuvent être raccordés ensemble. 10
11. Dispositif de protection personnelle (10) selon l'une quelconque des revendications précédentes, dans lequel la zone de chevauchement est une zone avant du torse d'un utilisateur. 15
12. Dispositif de protection personnelle (10) selon l'une quelconque des revendications précédentes, dans lequel la zone de chevauchement est une zone latérale du torse d'un utilisateur. 20
13. Dispositif de protection personnelle (10) selon l'une quelconque des revendications précédentes, dans lequel la partie résiduelle de l'élément gonflable n'a pas de zones superposées ni chevauchantes et est adjacente à la zone de chevauchement (A, B, C). 25
14. Dispositif de protection personnelle (10) selon l'une quelconque des revendications précédentes, dans lequel la structure de raccordement (50) comprend des inserts élastiques (55) ou est réalisée avec une matière élastique. 30
15. Dispositif de protection personnelle (10) selon la revendication 10, dans lequel chacun ou l'un des deux rabats comprend des inserts élastiques (50) ou est réalisé avec une matière élastique. 35
16. Vêtement (100) comprenant, ou en combinaison avec un dispositif de protection personnelle selon l'une quelconque des revendications précédentes. 40
17. Procédé pour protéger un utilisateur comprenant l'étape suivante : 45

agencer un élément gonflable (12) au moins par-

tiellement sur une région du corps de l'utilisateur, **caractérisé en ce que :**

une première partie (20, 30, 40) dudit élément gonflable (12) est superposée sur une seconde partie (21, 31, 41) de l'élément gonflable (12) dans une zone de chevauchement ou une zone de superposition (A, B, C) correspondante, et dans lequel la hauteur ou l'épaisseur d'au moins l'une ou de chacune parmi la première partie (20, 30, 40) de l'élément gonflable (12) et la seconde partie (21, 31, 41) de l'élément gonflable (12) est, dans la zone de chevauchement ou la zone de superposition (A, B, C), inférieure à la hauteur ou l'épaisseur d'une partie résiduelle (18) de l'élément gonflable (12).

18. Procédé selon la revendication 17, dans lequel la première partie (20, 30, 40) de l'élément gonflable (12) et la seconde partie (21, 31, 41) de l'élément gonflable (12) sont raccordées par des moyens élastiques de sorte que, pendant le gonflage de la première partie (20, 30, 40) de l'élément gonflable (12) et de la seconde partie (21, 31, 41) de l'élément gonflable (12), la première partie (20, 30, 40) de l'élément gonflable (12) et la seconde partie (21, 31, 41) de l'élément gonflable (12) s'éloignent temporairement l'une de l'autre, diminuant ainsi une condition de chevauchement respective et, à la fin du gonflage, les moyens élastiques reviennent dans une condition d'origine, de sorte que la première partie (20, 30, 40) de l'élément gonflable (12) et la seconde partie (21, 31, 41) de l'élément gonflable (12), se rapprochent à nouveau l'une de l'autre. 50

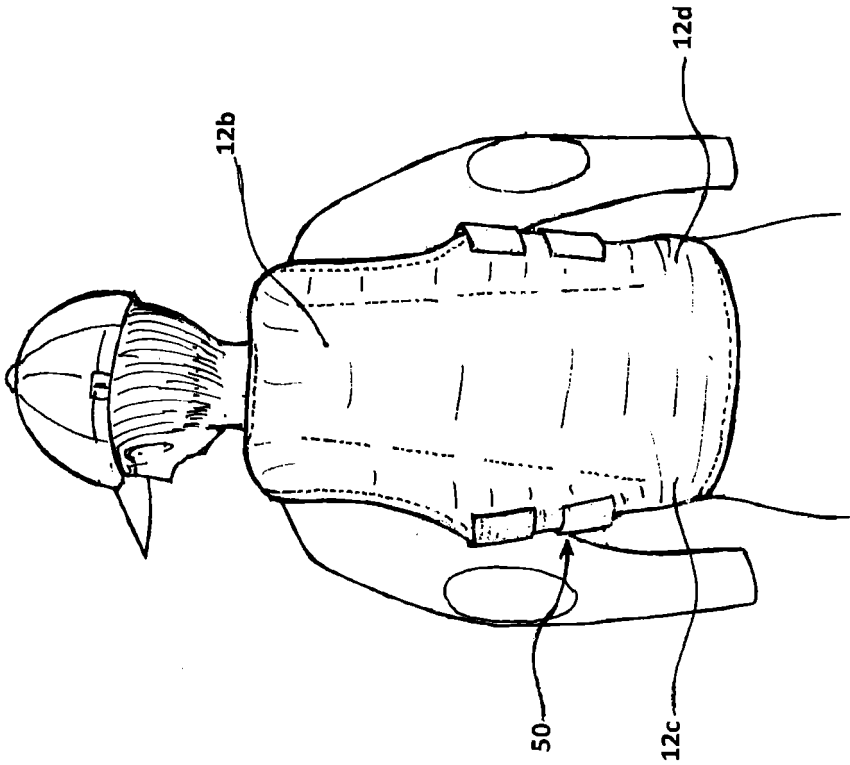


FIG. 2

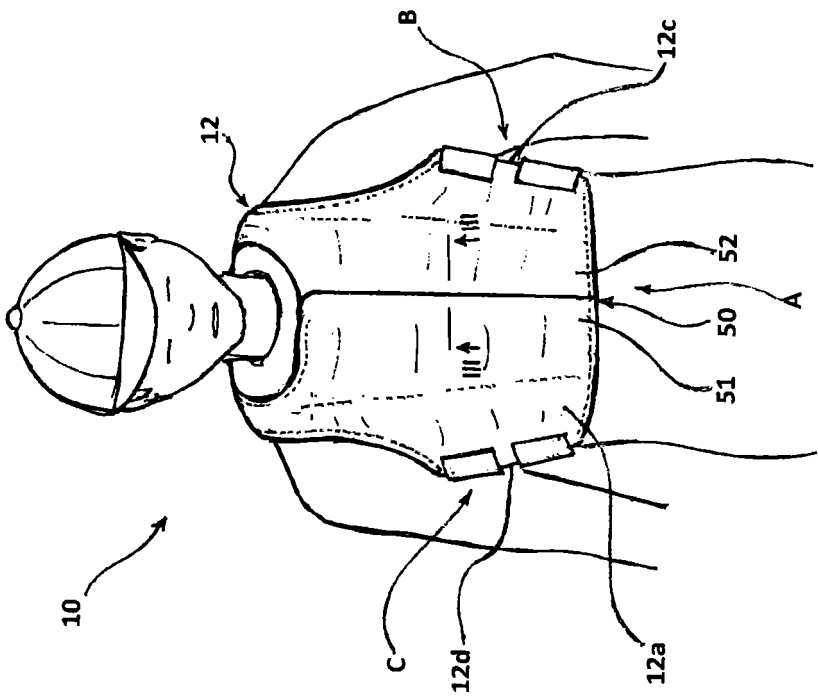


FIG. 1

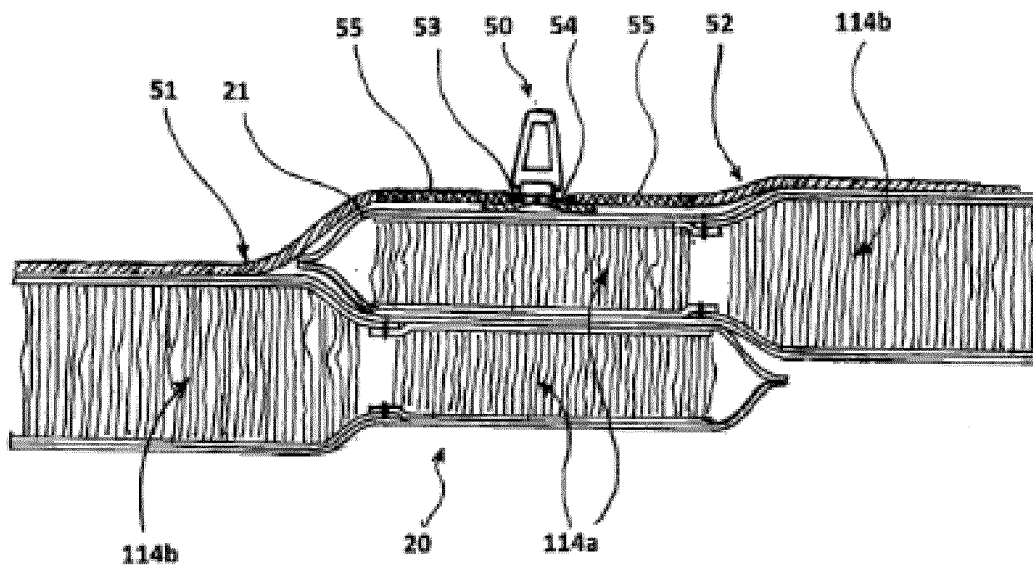


FIG. 3

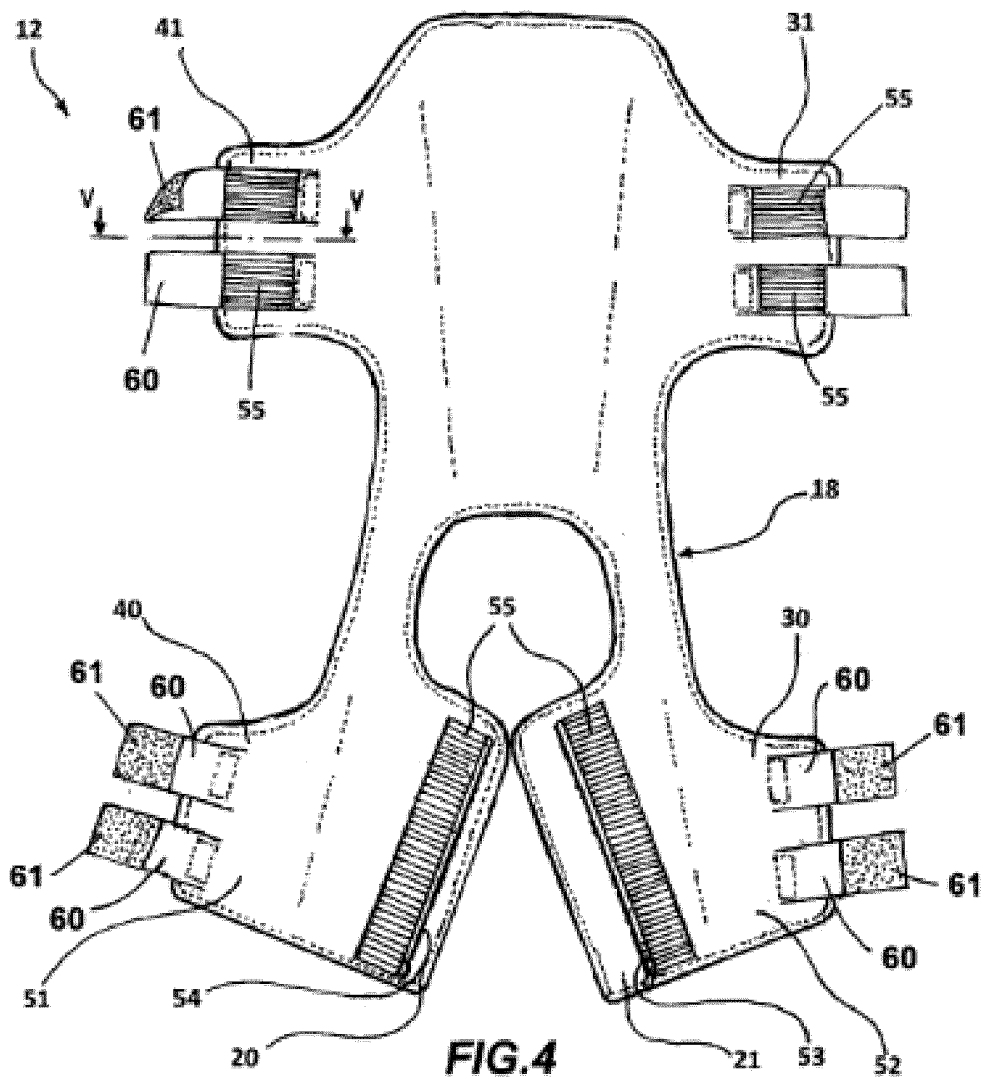


FIG. 4

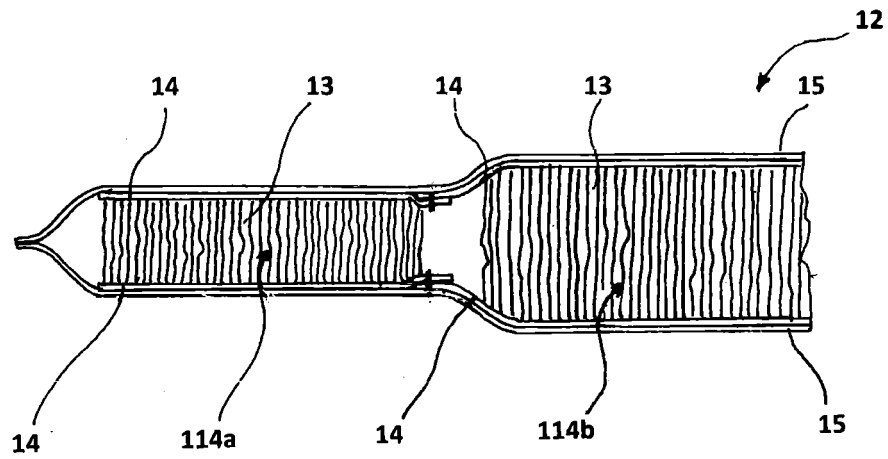


FIG.5

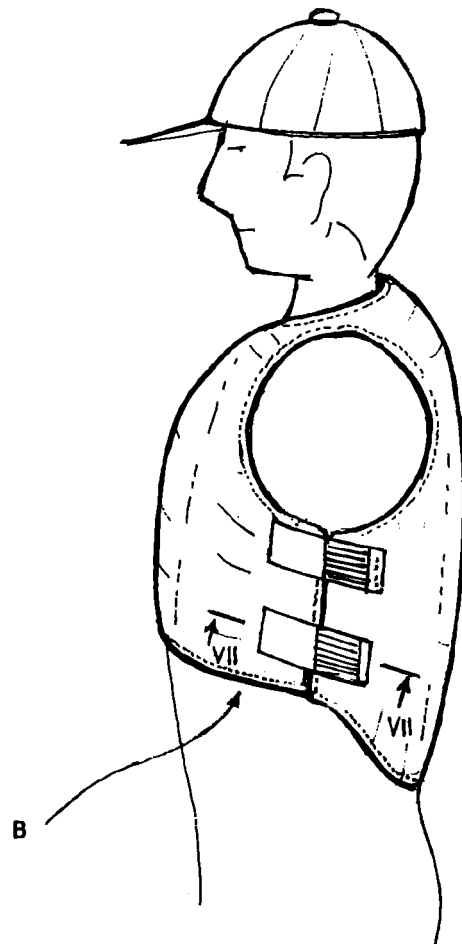


FIG.6

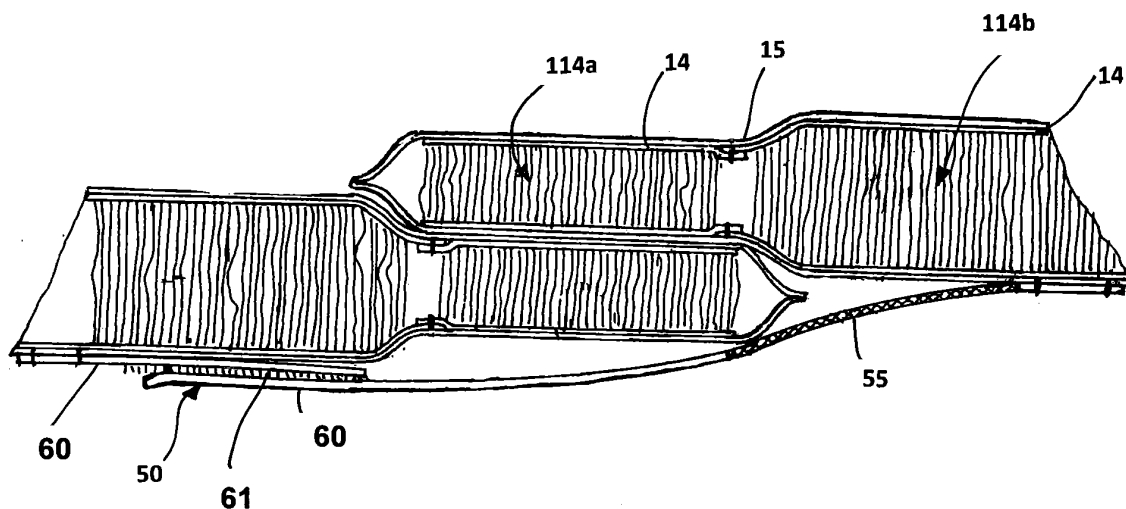


FIG.7

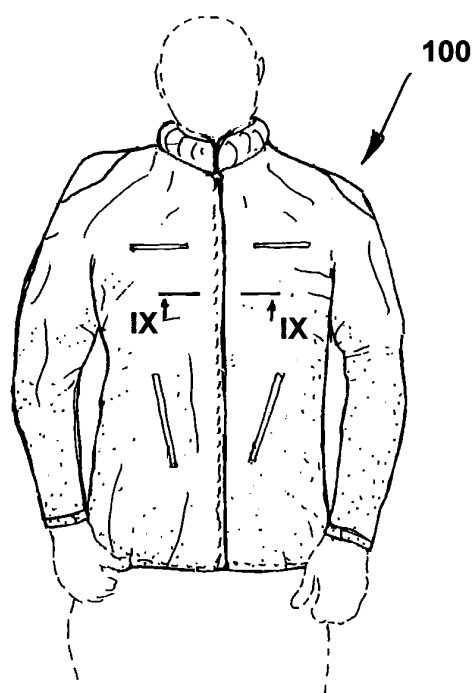


FIG.8

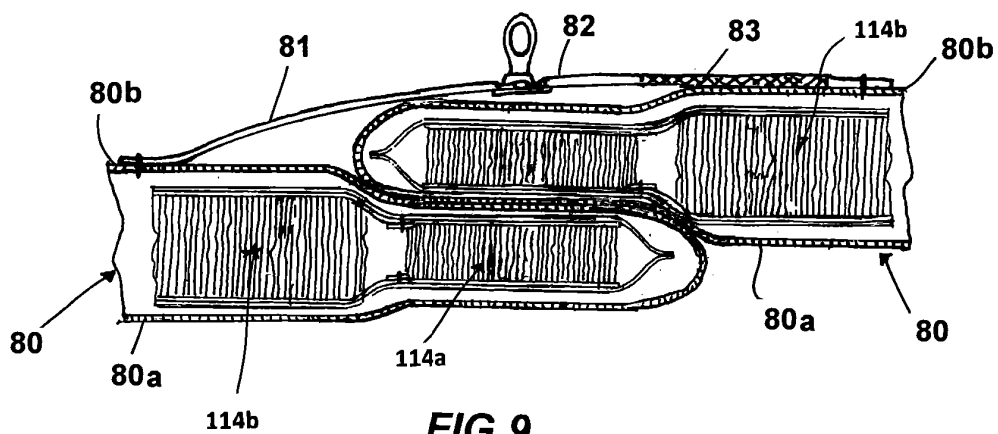


FIG.9

REFERENCES CITED IN THE DESCRIPTION

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